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Open-ocean convection becoming less intense in the Greenland and Iceland Seas

Kent Moore (1), Kjetil Vage (2), Robert Pickart (3), and Ian Renfrew (4)

(1) Department of Physics,University of Toronto, Toronto, Canada (gwk.moore@utoronto.ca), (2) Geophysical Institute, University of Bergen, Bergen, Norway (kjetil.Vage@gfi.uib.no), (3) Department of Physical Oceanography, Woods Hole Oceanographic Institution, Woods Hole, USA (rpickart@whoi.edu), (4) Centre for Ocean and Atmospheric Sciences, University of East Anglia, Norwich, UK (i.renfrew@uea.ac.uk)

The air-sea transfer of heat and freshwater plays a critical role in the global climate system. This is particularly true for the Greenland and Iceland Seas, where these fluxes drive open-ocean convection that contributes to Denmark Strait Overflow Water, the densest component of the lower limb of the Atlantic Meridional Overturning Circulation (AMOC). This buoyancy transfer is most pronounced during the winter downstream of the ice edge, where the cold and dry Arctic air first comes in contact with the relatively warm ocean surface. In this talk, we show that the observed wintertime retreat of sea ice in the region, which is exposing more of the ocean to interactions with the atmosphere, has led to a differential surface warming of the Greenland and Iceland Seas resulting in reductions of 15% and 25% in the magnitude of the respective air-sea heat fluxes since 1979. Model simulations show that further decreases in atmospheric forcing will cross a threshold for the Greenland Sea whereby convection will be depth limited, reducing the ventilation of mid-depth waters in the Nordic Seas. In the Iceland Sea, such reductions in atmospheric forcing will decrease the supply of the densest overflow waters to the AMOC.